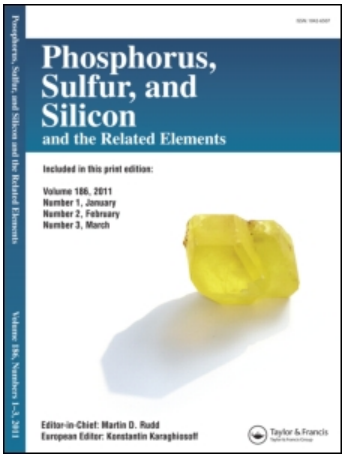

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Interaction Mechanism of Sodium Cyclotriphosphate with Fluiride in Water Solution

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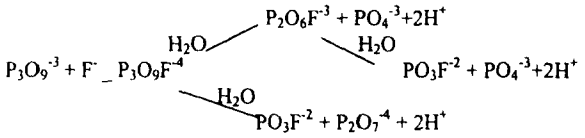
Some fluorophosphates are used as a dental materials. The most traditional and popular monofluoromonophosphate is Na_2PO_3F. Some other fluorophosphates may be interesting for similar purposes, for example, fluoropolyphosphates. We studied the formation of fluorophosphates via reaction of sodium cyclotriphosphate and sodium fluoride at boiling in water solution.

It was shown thet the mixture of depolymerized phosphates and fluorophosphates (monofluorotriphosphate, monofluorodiphosphate and monofluoromonophosphate) are formed as a result of such an interaction. The first two fluorophosphates are intermediate products of such transformations. Monofluorotriphosphate is the result of the interaction of cyclotriphosphate with fluoride and the other two are the products of hydrolysis.



The first stage of the interaction of cyclotriphosphate with fluoride is the opening of molecular rings $P_3O_9^{-3}$ due to the penetration F^- anions into one PO_4 tetrahedron of ring. The table indicates the frequancy of all P-O bends of cyclotriphosphate to be less when $Na_3P_3O_9$ dissolves in water.

TABLE Main bends of Raman spectra of sodium phosphates.

Salt	$\nu_s POP$, sm^{-1}		$\Delta\nu$, sm^{-1}	$\nu_s PO_2$, sm^{-1}		$\Delta\nu$, sm^{-1}
	Solid	Solution		Solid	Solution	
$(NaPO_3)_n$	683	687	+4	1165	1151	-14
$Na_3P_3O_9$	683	666	-17	1172	1156	-16

P-O(P) bends destructed at reaction, are more than in solid state. Hence, the elongation of chemical P-O bends in is a possible reason of F^- anions penetretion into PO_4 tetrahedrons, wich take place at dissolution of sodium cyclotriphosphate in water.

The table show P-O(P) bends of linear polyphosphates but to be shortly at dissolution of $(NaPO_3)_n$. That is why polyphosphates do not react with fluoride at boiling.